

WHAT IS CLAIMED IS:

1. An electro-kinetic device (“EKD”) for use in a procedure for electroporation of cells of a selected tissue to facilitate the introduction of macromolecules, comprising:
 - an electrode assembly having a plurality of needle electrodes for penetrating the selected tissue;
 - a current waveform generator in electrical communication with the plurality of needle electrodes for applying a constant-current pulse pattern between any plurality of electrodes;
 - a power source in electrical communication with the current waveform generator; and
 - a controller in communication with the current waveform generator and the power source, wherein the controller manages the electroporation procedure.
2. The electro-kinetic device (“EKD”) of claim 1, further comprising a waveform logger in communication with the controller for sampling and recording electroporation data related to the constant-current pulse pattern.
3. The electro-kinetic device (“EKD”) of claim 1, further comprising an impedance tester in electrical communication with the plurality of needle electrodes for determining resistance.
4. The electro-kinetic device (“EKD”) of claim 1, further comprising an input device for inputting commands into the controller.
5. The electro-kinetic device (“EKD”) of claim 4, wherein the input device is a keypad.
6. The electro-kinetic device (“EKD”) of claim 1, further comprising a status-reporting device for reporting status information during the electroporation procedure.
7. The electro-kinetic device (“EKD”) of claim 6, wherein the status-reporting device is an information display panel, an audible notification, a light-emitting diode (“LED”), or a combination thereof.

8. The electro-kinetic device (“EKD”) of claim 1, further comprising a communications port in communication with the controller for transmitting electroporation data related to the constant-current pulse pattern to external electronic devices.
9. The electro-kinetic device (“EKD”) of claim 8, wherein the communications port is an optical serial communications port.
10. The electro-kinetic device (“EKD”) of claim 8, wherein the communications port is an infrared port.
11. The electro-kinetic device (“EKD”) of claim 1, further comprising memory in communication with the controller for storing the electroporation data related to the constant-current pulse pattern.
12. The electro-kinetic device (“EKD”) of claim 11, wherein the memory is non-volatile.
13. The electro-kinetic device (“EKD”) of claim 1, wherein the power source is a battery.
14. The electro-kinetic device (“EKD”) of claim 1, wherein the electrode assembly further comprises a handle having a mount structure for fastening the plurality of needle electrodes to the handle.
15. The electro-kinetic device (“EKD”) of claim 14, wherein the electrode assembly further comprises an activation switch mounted on the handle and in communication with the controller.
16. The electro-kinetic device (“EKD”) of claim 1, wherein the electrode assembly further comprises a status-reporting device for reporting the status of the electroporation procedure.
17. The electro-kinetic device (“EKD”) of claim 16, wherein the status-reporting device is a light-emitting diode (“LED”).
18. The electro-kinetic device (“EKD”) of claim 1, wherein the plurality of needle electrodes is in a circular array.

19. The electro-kinetic device (“EKD”) of claim 18, wherein the circular array is about 1.0 cm in diameter.
20. An electrode disk adapted for use in an electroporation device having a handle assembly, comprising:
- a support structure capable of being removably mounted in the handle assembly and having a central channel for receiving an injection needle; and
 - a plurality of needle electrodes mounted on the support structure and having a spatial arrangement.
21. The electrode disk of claim 20, wherein the spatial arrangement of the plurality of needle electrodes is a circular array.
22. The electrode disk of claim 21, wherein the circular array is about 1.0 cm in diameter.
23. The electrode disk of claim 20, wherein the central channel is of sufficient length to extend through the handle assembly.
24. The electrode disk of claim 20, further comprising a guide disk having holes corresponding to the spatial arrangement of the needle electrodes and a central passage corresponding to the central channel of the support structure, wherein the guide disk may be removably mounted on the plurality of needle electrodes.
25. The electrode disk of claim 24, wherein the guide disk has a thickness corresponding to the desired depth of penetration of the plurality of needle electrodes.
26. The electrode disk of claim 24, wherein the electrode disk may be removably mounted in the handle assembly by grasping the guide disk.
27. A method for electroporating cells of a selected tissue to facilitate the introduction of macromolecules, comprising:
- inserting a plurality of needle electrodes having a central channel into the selected tissue;

measuring the resistance of the plurality of needle electrodes to determine if a circuit can safely be established through the selected tissue;

injecting a solution of the macromolecules by passing a needle through the central channel of the plurality of needle electrodes;

generating a constant-current pulse pattern between any plurality of electrodes using a software-based application;

applying the constant-current pulse pattern; and

electronically recording data related to the constant-current pulse pattern.